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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

ABEL-JALIL, NEVEEN

ART UNIT

PAPER NUMBER

2175

DATE MAILED: 11/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/740,540

Applicant(s)

ROBINSON ET AL.

Examiner

Neveen Abel-Jalil

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: ____.

DOV POPOVICI
SUPERVISORY PATENT EXAMINER
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DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6-9, 11-13, 16-19, 21-24, 26-28, and 31-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Christiansen (U.S. Patent No. 5,915,253).

Regarding claim 1, Christiansen discloses a data storage system comprising:

a first volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”);

a second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”); and

a computing node coupled to said first volume and said second volume (See figure 1, column 4, line 1, 9), wherein said computing node includes a file system (See figure 1, block 60) for identifying files stored by said first volume and said second volume (See figure 7, block 182);

wherein said file system (See figure 1, block 60) includes a directory structure (See column 5, lines 55-56, wherein “directory structure” reads on “index into object table”, column 12, lines 16-18) having an entry corresponding to a file maintained by said file system (See column 5, lines 60-61, wherein “entry corresponding to file” reads on “class reference points for file class”), and wherein said entry includes a field containing

a volume identifier (ID) (See column 15, table) indicative of which of said first or said second volumes said file is stored within (See column 4, lines 24-25, wherein “indicative of which of said first or said second” reads on “each object is owned by particular volume”, 40-44, wherein “indicative volume” reads on “create an object of that particular class”, also see, column 18, line 20-22).

Regarding claim 2, Christiansen discloses the file system (See figure 1, block 60) is configured to allocate space on said first volume and said second volume (See column 4, lines 23-26, 40-42) in response to receiving a request specifying a storage volume characteristic from a software application (See column 2, line 58-59).

Regarding claim 3, Christiansen discloses each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a single storage device (See figure 6).

Regarding claim 4, Christiansen discloses each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a multiple storage device system (See figure 1, column 4, lines 13-14).

Regarding claim 6, Christiansen discloses a file system (See figure 1, block 60) for use in a computing node (See figure 1, block 22) coupled to a first volume and a second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”),

wherein said file system is configured to identify files (See column 5, line 53) stored by said first volume and said second volume, wherein said file system (See figure 1, block 60) includes a directory structure (See column 5, lines 55-56, wherein “directory structure” reads on “ index into object table”, column 12, lines 16-18) having an entry corresponding to a file maintained by said file system (See column 5, lines 58-61), and wherein said entry includes a field containing a volume identifier (ID) indicative of which of said first or said second volumes said file is stored within (See column 15, table).

Regarding claim 7, Christiansen discloses the file system (See figure 1, block 60) as recited in claim 6, wherein said file system (See figure 1) is further configured to allocate space on said first volume and said second volume (See column 4, lines 23-26) in response to receiving a request specifying a storage volume characteristic from a software application (See column 2, lines 58-60).

Regarding claim 8, Christiansen discloses the file system (See figure 1, block 60) as recited in claim 7, wherein each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a single storage device (See figure 6).

Regarding claim 9, Christiansen discloses the file system (See figure 1, block 60) as recited in claim 8, wherein each of said first volume and said second volume (See

figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a multiple storage device system (See figure 1, column 4, lines 13-14).

Regarding claim 11, Christiansen discloses a method of operating a file system (See column 4, line 14-15, “operating file system” reads on “ maintaining the location of objects on storage devices”) which identifies files stored by a first volume and a second volume (See figure 1, blocks 28/32/36, wherein “identifies files” reads on “PTR to file class”), said method comprising:

providing a filename corresponding to a file maintained by said file system (See column 5, lines 60-61, wherein “filename” reads on “class reference”) ; and

accessing an entry (See column 9, line 47) in a directory structure (See column 5, lines 55-56, wherein “directory structure” reads on “ index into object table”, column 12, lines 16-18), wherein said entry includes a field containing a volume identifier (ID) (See column 15, table) indicative of which of said first or said second volumes said file is stored within (See column 5, line 67, and column 6, lines 1-2, wherein “indicative of which volume” reads on “unique identifier associated with object”).

Regarding claim 12, Christiansen discloses the method further comprises allocating space on said first volume and said second volume (See column 12, line 20-22, wherein “allocating space” reads on “object associated with particular volume”) in response to receiving a request specifying a storage volume characteristic from a software application (See column 2, lines 58-60).

Regarding claim 13, Christiansen discloses each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a single storage device (See figure 6).

Regarding claim 16, Christiansen discloses computer readable medium (See figure 1, block 22) comprising instructions for operating a file system (See column 1, line 16) which identifies files stored by a first volume and a second volume (see figure 6, objects 26/30/34), wherein said instructions are executable by a computing node (See figure 1) to implement a method comprising:

providing a filename corresponding to a file maintained by said file system (See column 5, lines 60-61, wherein “filename” reads on “class reference”); and
accessing an entry (See column 9, line 47) in a directory structure (See column 5, lines 55-56, wherein “directory structure” reads on “ index into object table”, column 12, lines 16-18), wherein said entry includes a field containing a volume identifier (See column 15, table) indicative of which of said first or said second volumes said file is stored within (See figure 7, block 192).

Regarding claim 17, Christiansen discloses the computer readable medium (See figure 1, block 22) as recited in claim 16, wherein said method further comprises allocating space on said first volume and said second volume (See column 4, lines 23-26,

40-42) in response to receiving a request specifying a storage volume characteristic from a software application (See column 2, lines 58-59).

Regarding claim 18, Christiansen discloses the computer readable medium (See figure 1, block 22) as recited in claim 17, wherein each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a single storage device (See figure 6).

Regarding claim 19, Christiansen discloses the computer readable medium (See figure 1, block 22) as recited in claim 17, wherein each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a multiple storage device system (See figure 1, column 4, lines 13-14).

Regarding claim 21, Christiansen discloses a data storage system comprising:

- a first volume (See figure 6, objects 26/30/34);
- a second volume (See figure 6, objects 26/30/34); and
- a computing node (See figure 1) coupled to said first volume and said second volume, wherein said computing node (See figure 1) includes a file system (See figure 1, block 60) for identifying a first file stored on said first volume and a second file stored on said second volume (See column 4, lines 24-25, wherein “identifying a first file stored on said first volume” reads on “each object is owned by particular volume”, 40-44, wherein

“indicative volume” reads on “ create an object of that particular class”, also see, column 18, line 20-22);

wherein said file system includes a directory structure having a directory (See column 5, lines 55-56) which includes a first entry corresponding to said first file and a second entry corresponding to said second file (See column 12, line 18).

Regarding claim 22, Christiansen discloses the file system is configured to allocate space on said first volume and said second volume (See column 4, lines 23-26, 40-42) in response to receiving a request specifying a storage volume characteristic from a software application (See column 2, lines 58-60).

Regarding claim 23, Christiansen discloses each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a single storage device (See figure 6).

Regarding claim 24, Christiansen discloses each of said first volume and said second volume (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) comprises a multiple storage device system (See figure 1, column 4, lines 13-14).

Regarding claim 26, Christiansen discloses a method comprising:

storing a first file on a first volume based on a first set of storage characteristics desired for said first file (See column 8, lines 6-7, wherein “characteristics” reads on

“plurality of class methods”), wherein said first file is located in a directory of a directory structure maintained by a file system (See figure 7); and

storing a second file on a second volume based on a second set of storage characteristics desired for said second file, wherein said first file is located in said directory (See column 12, lines 16-18).

Regarding claim 27, Christiansen discloses comprises allocating space on said first volume and said second volume (See column 4, lines 23-26) in response to receiving a request specifying a storage volume characteristic from a software application (See column 2, lines 58-60).

Regarding claim 28, Christiansen discloses each of said first volume and said second volume comprises (See figure 6, blocks 26/30/34, wherein “volume” reads on “object”) a single storage device (See figure 6).

Regarding claim 31, Christiansen discloses a computer memory (See column 4, lines 31-34) containing a directory structure (See column 5, lines 55-56, wherein “directory structure” reads on “ index into object table”, column 12, lines 16-18) maintained by a file system (See figure 7) having a first entry in a directory corresponding to a first file and a second entry in said directory corresponding to a second file (See column 5, lines 60-61, wherein “entry corresponding to file” reads on “class reference points for file class”), wherein said first file is stored on a first volume

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having a first set of storage characteristics and said second file is stored on a second volume having a second set of storage characteristics (See column 4, lines 20, 31-35).

Regarding claim 32, Christiansen discloses a computer memory (See figure 1, block 22) containing a data structure for storing a directory (See figure 1, line block 40) having an entry corresponding to a file maintained by said file system (See column 5, lines 60-61, wherein "entry corresponding to file" reads on "class reference points for file class"), wherein said entry includes a field containing a volume identifier (See figure 7, block 182, column 15, table) which indicates a volume said file is stored within (See figure 7, block 180).

Regarding claim 33, Christiansen discloses a data storage system comprising:
one or more volumes (See figure 6, blocks 26/30/34, wherein "volume" reads on "object");

a computing node coupled to said one or more volumes (See figure 1), wherein said computing node includes a file system for identifying files stored by said one or more volumes (See figure 1, blocks 28/32/36, wherein "identifying files" reads on "PTR to file class", and "volumes" reads on "objects 1/2/3");

wherein said file system (See figure 1, block 60) includes a directory structure (See column 5, lines 55-56, wherein "directory structure" reads on "index into object table", column 12, lines 16-18) having an entry corresponding to a file maintained by said file system (See column 5, lines 60-61, wherein "entry corresponding to file" reads on

“class reference points for file class”), and wherein said entry includes a field containing a volume identifier indicative of which of said one or more volumes said file is stored within (See figure 7, block 182, column 15, table).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 5, 10, 14, 15, 20, 25, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Christiansen (U.S. Patent No. 5,915,253) in view of Napolitano et al. (U.S. Patent No. 6,219,693).

Regarding claims 5, 10, 15, 20, 25, and 30, although Christiansen teaches positioning the stored data in predetermined slots of a function pointer array (See column 9, lines 43-45)

Christiansen does not teach wherein said multiple storage device system is a redundant array of inexpensive disks (RAID) storage system.

Napolitano et al. teaches the specific methodology of redundant array of inexpensive disks employed in the storage system (See column 2, lines 24, 30).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to have modified Christiansen to include a RAID based storage system.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have modified Christiansen by the teaching of Napolitano et al.,

because the use of redundant array of inexpensive disks in storage systems provides more robust disk storage architecture in multiple device storage systems by utilizing all available space, making them highly efficient.

Regarding claims 14, and 29, Christiansen does not teach said first volume and said second volume are each a logical volume, wherein said each logical volume comprises a multiple storage device system.

Napolitano et al. teaches said first volume and said second volume are each a logical volume (See column 1, lines 15-17, column 8, lines 10-12), wherein said each logical volume comprises a multiple storage device system (See figure 10A).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to have modified Christiansen to include said first volume and said second volume are each a logical volume, wherein said each logical volume comprises a multiple storage device system.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to have modified Christiansen by the teaching of Napolitano et al.,

because the use of logical volume space in storage systems provides more robust disk storage architecture in multiple device storage systems by utilizing all available space reducing physical space utilization, making computer physical storage units highly efficient.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bridge (U.S. Patent No. 6,405,284).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neveen Abel-Jalil whose telephone number is 703-305-8114. The examiner can normally be reached on 8:00AM-4: 30PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 703-305-3830. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7240 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Neveen Abel-Jalil
November 17, 2002

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